



# Species

## Ecology of White-rumped vultures (*Gyps bengalensis*) in Northern and Central India

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### ABSTRACT

White-rumped vultures (*Gyps bengalensis*) are listed as Critically Endangered species after the drastic population decline in India. Small populations of White-rumped vultures are residing in the natural habitats in various regions of North-Central India that includes the districts of Uttar Pradesh and Madhya Pradesh. The study started in 2008 and is still continuing. The aim of the study was to understand the behavior of these master scavengers in the natural landscapes and to ensure the protection of these sites by involving the local communities. The outcomes reflect the breeding, feeding and roosting behavior of White-rumped vultures in different eco-zones of North-Central India and the factors having positive and negative effects on their population.

**Key words:** White-rumped Vultures, Critically endangered, North-Central India

## 1. INTRODUCTION

The White-rumped vultures are one of the 15 types of Old World vultures found in Europe, Asia and Africa. Before the 1990s, the White-rumped was perhaps the most abundant vulture in the world, predominantly in north India. It also occurred in Pakistan, Bangladesh, Nepal, Bhutan, Myanmar, Thailand, Laos, Cambodia and southern Vietnam, and earlier from southern China and Malaysia, but profuse population was found only in India, southern parts of Nepal and the Punjab province of Pakistan<sup>[1]</sup>. Till 1980s they were even seen as a annoyance and hindrance, particularly to aircraft as they were often involved in bird strikes<sup>[2, 3]</sup>. With the calamitous decline in 90s, it was upgraded to Critically Endangered category in IUCN Red List in 2000<sup>[4]</sup>. The once abundant and over-looked scavenger is now a Schedule I bird of Wildlife Protection Act, 1972. The White-rumped vultures are open countryside scavengers that avoid dense forests and wooded hilly regions. They locate the large carcasses, visually and use thermals to soar up at high altitudes so as to covering vast areas of hundreds of square kilometers in a single day<sup>[1]</sup>. Vultures being obligate and primary scavengers feed solely on carcasses. They differ from facultative scavengers that opportunistically feed on carrion (secondary scavengers) as their many adaptations such as long neck and bald head, excellent soaring flight and low stomach pH (1-2) are specialized towards finding and consuming carcasses in a very efficient manner<sup>[5,6]</sup>. *Gyps bengalensis* is the smallest member of *Gyps* species. The White-rumped vulture is a resident species with a vast habitat range. It lives in flocks and breeds on tall trees in small scattered colonies<sup>[1]</sup>. Various studies have been undertaken on *Gyps bengalensis* to estimate its population status, habitat use pattern, breeding success along with behavioural studies<sup>[7-14]</sup>.

## 2. METHODOLOGY

### Study Area

The study started in 2008 and is continuing to know and understand the necessities of the surviving vulture population. The area covered includes several districts of Uttar Pradesh and Madhya Pradesh. In Uttar Pradesh the terai (Bahraich, Lakhimpur Kheri, Shravasti, Balrampur, Maharajganj,) and Bundelkhand (Lalitpur, Chitrakoot) region has rich promising population of White-rumped vultures. In Madhya Pradesh, this species is reported from several protected and unprotected areas (Tikamgarh, Sagar, Ashoknagar, Shivpuri, Panna, Sheopur, Damoh, Bhopal, Raisen, Chhatarpur).

### Data Collection

Secondary data was collected to identify the possible vulture occurrence spots within the districts of Bundelkhand Region. Regular visits were made in the selected regions to count the number of breeding pairs at each colony. Indirect signs of vultures such as white washes and molted feathers were searched to locate vulture breeding colonies. Surveys were carried out on the basis of the following key criteria: presence of water body, safe trees, large rocks and cliffs, wildlife, livestock population, and carcass dumping ground<sup>[15]</sup>. Sugar factories, Bone mills and fertilizer factories were also key criteria for survey work. Observational recordings were done Using data sheets and 10x50 binoculars. Photographical and video recordings were with the help of 7D DSLR Canon Camera and 70D SLR Canon Camera.

## 3. RESULT AND DISCUSSION

### 3.1. Feeding ecology

Like the other vulture species, White-rumped Vultures feed entirely on carrion and often associate with other vulture species (Long-billed vultures and Red-headed vultures in Bundelkhand region; Himalayan and Eurasian griffon, Cinereous vultures in Terai region). Inspite of being the smallest of *Gyps* species, White-rumped Vultures have a large wing-span so they can easily soar or sail which is the most remarkable and highly specialized mode of flight (Fig.1). It is their skill and efficiency in flight which is one of the reasons that has made vultures successful as scavengers. Food is thus located by soaring high using the thermals with other vulture species. They are capable of detecting the air currents indicating the skill of perception of their surroundings. This prevents the loss of kinetic energy. The thermals are utilized to fly up to high altitudes (Fig.2). The White-rumped vultures scavenge on the soft tissues of large mammals, usually ungulates. In Northern-central region of India, they get the opportunities to feed on the carnivore kills as well as the cattle that die naturally or accidentally. Their naked i.e. featherless heads and necks are an adaptive characteristic that permits them to fully insert their head into a carcass with a low risk of exposing their bodies to harmful micro-organisms and preventing parasites to colonize as well as they prevent the stinking of feathers during feeding<sup>[16]</sup>. The beaks are long and hooked to feed upon the carcasses. They are operated by well developed mandibular muscles and easily tear open the flesh (Fig.3). They mutilate the carcass and leave the bones virtually clean. Since they do not hunt, the toes are feeble, poorly padded and have simple slightly curved talons. This assists them to balance themselves while feeding on carcasses. Their large feet also facilitate in achieving the

grip. They place the feet steadily on the carcass so as to pull away the flesh with its beak. Thus the vulture has been characterized with a "walking" rather than a "raptor" foot [17].



**Fig.1:** Large wing-span of White-rumped vulture



**Fig.2:** Flying at high altitudes using thermal energy



**Fig.3:** Morphology of White-rumped vulture

Water bodies are essential and plays central role in the daily activities of vultures. Before moving out in search of food, the vultures drink water from the nearby water body. Long-billed vultures are observed to spend at least 20-30 minutes in flocks, at the same spot every day. Also, vultures are clean birds they take a bath after every meal so water bodies are important. They do this so that the blood from carcasses does not stay in their feathers or on their skin, infecting the vultures with diseases [11].

When fulfilled, they expand out their crop, throat and neck and go for sun basking. This was more commonly exhibited by the fledglings and sub adults. They stretch out their wings, facing the sun rays (Fig.4). Sunning decimate the bacteria and other microorganisms on their body. This may continue for an hour or so till the meal is digested and the birds is ready to take off the flight that demands a lot of work-input due to their heavy weight i.e. a run and leap [18]. The major threat to the feeding birds is the high rise in the population of feral dogs. Interruption due to feral dogs was seen almost at all the carcasses. They do not allow the vultures to feed and chase them as they try to closer to the carcass (fig.5). At every carcass, vultures were seen waiting to feed while the feral dogs kept a keen eye and guarded the carcass. To overcome this, the Forest department of Uttar Pradesh took the initiative to construct two vulture restaurants, one in Lalitpur and other in Balrampur district. However both are non-functional at present. The species adapts well to supplementary food provided at vulture restaurants [19].



**Fig.4:** Sun basking after the meal



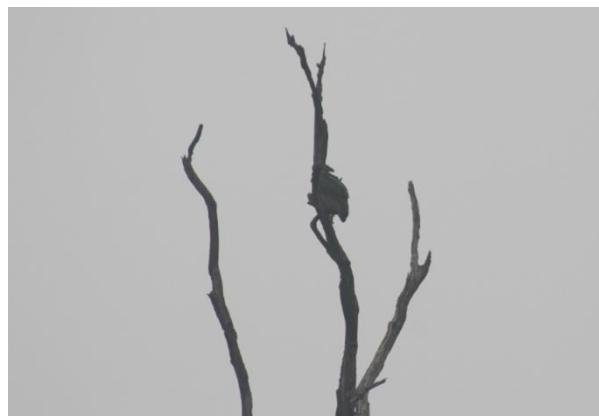
**Fig.5:** Vultures chased by feral dog

### 3.2. Roosting behavior

It is a highly social species and is usually found in conspecific flocks and regular communal roost sites are used. They roost together on large trees with little or no foliage (Fig.6). In winters, they form large flocks with the migratory Griffon Species. During the non-breeding season, the adults and sub-adults roost together in rather smaller numbers. The depleting number of large trees favorable for roosting is a serious problem. The pruning of trees by the local people also renders them unfit for roosting (fig.7). This increases the threat to the birds that start roosting on mobile and electricity towers. In the Terai region of Uttar Pradesh, large flocks of vultures were seen mainly on Sacred Fig (*Ficus religiosa*), North Indian rosewood (*Dalbergia sissoo*), Red-silk cotton (*Bombax ceiba*), Haldia (*Haldina cordifolia*) and Teak (*Tectona grandis*). Large groups with around 600 vultures of migratory species have been recorded in the winters. In Bundelkhand region, Sacred fig (*Ficus religiosa*), is the most preferred tree by the White-rumped vultures (fig.8) followed by Arjun (*Terminalia arjuna*) and Teak (*Tectona grandis*).



**Fig.6:** OWRV roosting on trees with less foliage



**Fig.7:** Pruned trees unfit for roosting



**Fig.8:** OWRV roosting on Sacred fig (*Ficus religiosa*)



### 3.3. Breeding ecology

There are no morphological differences in the male and female White-rumped vultures. They usually pair for life. The breeding period is long, starting from October i.e. nest construction till May when the Fledgling is ready to leave the nest. The parents invest their energy for 8 months to raise a single chick. The breeding pair starts nest construction in October. The nest is a large massive platform of sticks on the strong branches of the selected tree so as to withstand rainfalls and storms. The adults collect the sticks and twigs from the nearby area and arrange them to construct a sturdy nest. If not disturbed, the same sites and nests are reused by the pair for consecutive years. For this reason, no empty or deserted nest was collected to study the nesting material. In case of White-rumped vultures, the type of branch platform sustaining the nest is usually "Chandelier" i.e a sort of crown of 3-5 branches arising from the same point of the trunk or from a branch of 1st order (rarely of 2nd order) in a vertical or sub-vertical orientation (Fig.9). Sometimes "Open Hand"- type is seen. In this, the nest is located corresponding to the point of ramification into 2-5 branches of a branch of 1st or 2nd order, positioned in a horizontal or sub-horizontal orientation (Fig.10). In all cases nests are located at the branch intersection. Mostly a single nest was observed on a single tree. However, two nests were occasionally seen on large Peepal and Semal trees (Fig.11). A study by Murn *et al.*<sup>[20]</sup> indicates that the spatial pattern of nests relies on both the distribution of trees and the ability of trees to support more than one nest. These results highlight that the preservation of larger nest trees and the sustainable management of timber resources are essential components for conservation management.



**Fig.9:** Chandelier type nest of OWRV



**Fig.10:** Open-hand type nest of OWRV



**Fig.11:** Two nests on Peepal tree in Lalitpur, Uttar Pradesh

Since 2008, a number of breeding sites have been recorded from the study area. Some of them have been disturbed and are therefore inactive now. One such case is that of the breeding colony in Kothigulenda of Tikamgarh, M.P. The nests of *Gyps bengalensis* were on the Arjun trees (*Terminalia arjuna*) in 2012 (Fig.12). The trees were chopped off by the villagers of Digwaar, at a distance of 3-4 kms (Fig.13). Once disturbed the vultures do not reconstruct their nests at those sites. The nests on peepal trees in the village are also deserted (Fig.14) or occupied by other raptors such as Short-toed snake eagle (*Circaetus gallicus*). The villagers are not aware of the consequences of cutting the tree branches for the livestock. The chopped branches are not suitable for the massive nests constructed by the White-rumped vultures. Similarly, the nesting sites in Katerniaghata Wildlife sanctuary became inactive due to the natural disasters such as heavy rainfall followed by storms and also because of forest fire (Kushwaha, 2014) (Fig.15).



**Fig.12:** Nest of *Gyps bengalensis* on the Arjun tree



**Fig.13:** Chopped off Arjun trees



**Fig.14:** Nest occupied by Short-toed snake eagle (*Circaetus gallicus*).



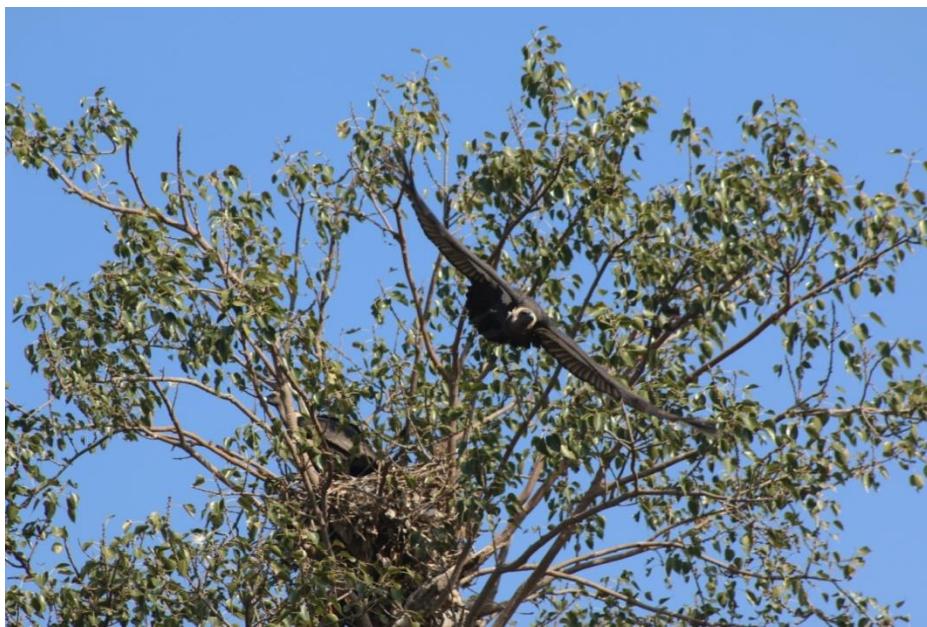
**Fig.15:** Nesting trees destroyed in forest fires in Katerniaghata Wildlife Sanctuary

Although small, the colonies of White-rumped vultures still exist in the natural habitats with successful breeding records. Unlike the Long-billed vultures, White-rumped vultures were observed to nest in small colonies in tall and strong trees with less or no foliage so as to avoid hindrance in movements (fig.16 a, b & c).



**Fig. 16 a & b:** Nests on high, strong with less foliage





**Fig.16c:** White-rumped vultures nesting in tall and strong trees with less or no foliage

The colonies were located mostly near human habitation whether in protected or unprotected areas. The nesting sites were adjacent to water bodies such as Betwa in Bundelkhand, Girwa in Katerniaghata, Ken in Panna, Sindh in Shivpuri and season streams, lakes or reservoirs [21, 22].

Both the parents share the incubation duties. The incubation period is of 40-45 days. The single egg hatches in last week of December or first week of January. The chick is altricial and poikilothermic for several days after hatching. Therefore an adult brood it until it is able to thermoregulate. Levenson (1979), Mendelsohn & Leshem (1983)<sup>[23, 24]</sup> mention that the nestlings are fed on predigested food till it is at least five weeks old. Later it receives the food that has been stored in the crop and regurgitated. The breeding cycle is long lasting for atleast 7-8 months. The White-rumped vultures endow their young ones with excellent parental care. From the time of egg laying till the juvenile start their first flight, one of the two parents is always seen in or around the nest. The juveniles then keep exercising their wings outside the nest, on the adjacent branches for other 8-10 weeks as flightless birds. They keep moving about near the nests, spending hours at one place (Fig.17 a-d). This is known as the Branching period <sup>[10]</sup>. Branching helps to gain critical flight skills and build up muscles of their large wingspans.

The breeding success depends on the availability of food, there is high probability for the parent vultures to get food in the winter months due to high mortality of cattle due to the cold. Generally, optimal hatching dates occur a few days proceeding to seasonal peaks in food resources permitting chicks to access food resources over a longer time period, thus providing the maximum abundance of food at the time of highest energetic requirements <sup>[25, 26]</sup>. After spending 4-5 months in the nest, the fledglings join the adults and sub-adults in foraging and other activities such as sun basking after feeding and roosting (Fig.18).



**Fig.17a :** Adult incubating the egg



**Fig. 17b:** Chick in nest



**Fig.17c**: Juvenile sitting in nest



**Fig.17d**: Fledgling outside the nest "Branching"



**Fig.18**: Sub-adults sun basking and feeding with adults



#### 4. CONCLUSION

The outcomes reflect the breeding, feeding and roosting behavior of White-rumped vultures in different eco-zones of North-Central India and the factors having positive and negative effects on their population. There is an urgent need to monitor and protect the hotspots of White-rumped vultures in natural habitats so that the population trends are known. The identified hotspots should be marked as Vulture Safe Zones. Special measures should be taken for collaborative management involving local communities, Forest Department, Agricultural department, Animal Husbandry, Researchers and NGOs so that they synchronize to carry out activities associated with vulture conservation and management. Mass motivation and awareness in the vulture hotspots will help in regular monitoring so that all the cases of injured/sick vultures are recorded and reported timely. Awareness can be through lectures, interactive discussions, celebration of International Vulture Awareness Day, various competitions on vultures in schools, field surveys and awareness material distribution. No conservation is possible without involving the local communities.

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#### Conflict of Interest

The author has no conflict of interest to be declared.

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#### Data and materials availability

All data associated with this study are present in the paper.

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